daphic scientific

leaders in the science of light, gas & water

User's Manual

50% CO2 & 100% CH4 Sampling Data Logger

Model Covered

ESCM-191

WARNING!

Install our complimentary GasLab® software before connecting your CO2 Meter product(s) to your computer. Failure to do so may affect the ability for GasLab® to detect your sensor.

Save sensor information for future reference

Model Number: _____

Serial Number: _____

Purchase Date: _____

www.edaphic.com.au
info@edaphic.com.au
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WARNING!

Install our complimentary GasLab® software before connecting your CO2Meter product(s) to your computer. Failure to do so may affect the ability for GasLab® to detect your sensor. If this happens, please follow the instructions shown in the "USB Driver Installation Instructions" section on page 18 of this manual.

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Welcome

Please take some time to read through this manual in order to become familiar with the sensor. Also, please pay special attention to the important safeguards shown on the next page.

Important Safeguards

To reduce the risk of fire, electrical shock and/or injury to persons, basic safety precautions should always be followed when using electrical appliances, including the following:

1. READ ALL INSTRUCTIONS BEFORE USING THIS SENSOR.
2. INSTALL THE GasLab® SOFTWARE BEFORE CONNECTING METER TO A COMPUTER.
3. Use only the included power supply to operate this meter. Inappropriate voltage supply could cause irreparable damage to this device.
4. Do NOT use rechargeable AA batteries.
5. Duracell brand AA Alkaline batteries are recommended
6. Do not store the meter with the AA Alkaline batteries installed to prevent the potential for battery leakage.
7. Make sure that the tubes are securely attached to the meter before sampling a closed environment.
8. Do not operate with an obstructed sample path.
9. This meter is not designed for outdoor use.
10. Do not expose this meter to water or any liquids.
11. Do not operate this meter if the enclosure is opened.
12. Do not operate the device if it is malfunctioning.

SAVE THESE INSTRUCTIONS!

Package Contents

Please verify that your package contains the following items before using this meter:

UNITS:

- (1) Meter
- (1) 6-foot USB cable
- (1) International power supply
- (1) High-impact carrying case
- (1) Calibration Tag
- (1) User manual
- (1) Fittings, tubing, & filter kit:
    - (1) 10-foot long 1/8" tubing
    - (2) 1/8" Barb tubing bulkhead fitting
    - (2) 1/8" Barb 10-32 UNF fittings
    - (2) Particulate filter (CM-0118)
    - (2) Hydrophobic filter (CM-0117)
    - (1) Moisture trap (CM-0112)

Figure 1: Basic kit - all units

Optional Accessories

If the meter is to operate in environments where humidity is very high (>95% RH), an *Extreme Moisture Filter* (CM-0103) can be purchased separately. This filter will allow free flow of sampled air while keeping moisture out of the meter. A 10,000-hour pump is also available at the time of purchase.

Note: Please contact our technical support staff for more details about these or any other accessories.

GasLab® Software

IMPORTANT: MAKE SURE TO INSTALL SOFTWARE BEFORE CONNECTING YOUR SENSOR TO YOUR COMPUTER.

Minimum System Requirements

To utilize our free software, the computer must meet the following minimum requirements:

- 1GHz processor with 1GB of RAM, 1GB free disk space (2GB free disk space for 64-bit systems).
- Windows XP*/7/8/8.1 with Microsoft .NET Framework 4.0** or later.
- On Intel-based Mac computers, GasLab® software can run using a Windows 7/8 virtual machine software such as *VMware Fusion*® or similar.

*Microsoft .NET is not supported on Media Center or Tablet editions.
**Installer will optionally install .NET Framework.

Visit www.co2meter.com/pages/downloads to download our complimentary GasLab® software to your computer. You can also download the GasLab® user manual in PDF from this page.

Please read the GasLab® user manual carefully to become more familiar with how the software works so that you can get the maximum benefit from this useful tool.

Install the GasLab® software first to ensure that the proper driver, necessary for the sensor, is installed on your computer before connecting the sensor.

Figure2: GasLab® download page (Internet Explorer 11 shown)

Follow the steps and instructions prompted by your computer's operating system. Make sure you have administrator privileges in order to install this program.

NOTE: We strongly recommend allowing GasLab® to install drivers for the sensor automatically.

Software Capabilities

Our GasLab® software will allow users to:

- Manage and download logs
- Configure sensor
- Adjust logging intervals
- Calibrate the sensor
- Collect data real-time

Powering the Unit

This meter can be powered by four (4) AA size batteries (not included) but sampling units can also be powered by the included 6VDC international wall power supply. These units should NOT be powered using the included USB cable since it supplies inconsistent voltage to the meter, which degrades sensor accuracy.

If the unit is not going to be used for an extended period of time, batteries should be removed to prevent damage due to potential battery leakage.

The power switch ⏻ on the left side of the meter turns the unit ON/OFF. The LOG switch on the right side of the meter enables/disables data logging and pump function.

Product Overview

This portable CO2Meter, Inc. sampling data logger or sample draw meter is designed to monitor carbon dioxide (CO2) and methane (CH4) simultaneously, in real-time. The warm-up period is 2 minutes.

Sampling data loggers log data for a specified period of time and store up to 60,000 data points to its internal memory to be retrieved at a later time for analysis.

When combined with our GasLab® software, it allows you to see data in real time on your computer's screen. Its built-in 1,000-hour (10,000-hour optional) sampling micro-pump ensures reliable operation for persistent readings based on user-selected time intervals. This meter is ideal for the following applications:

- Natural gas processing
- Algae-based biogas production
- Fermentation monitoring and validation
- Agricultural CO2 up-take analysis

Scientific devices such as this oxygen meter require users to have intimate knowledge of the sensor's features, limitations, operation, required software, and specifications prior to use. CO2Meter, Inc. highly recommends reading this user's manual before operating this sensor, especially the *Important Safeguards* section on page 4.

This meter allows you to simultaneously monitor carbon dioxide and methane in concentration levels from zero to 50% and 100%, respectively.

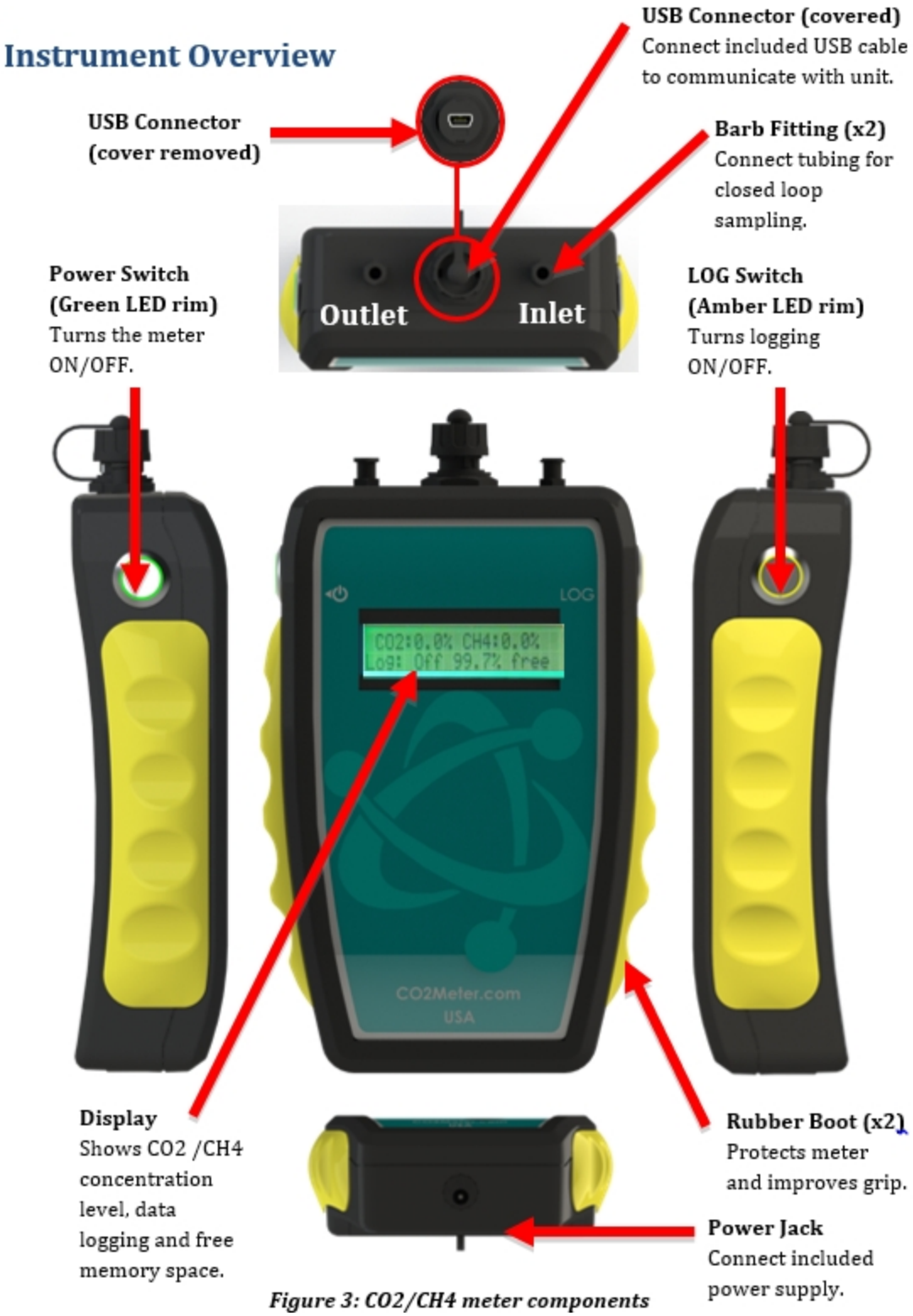

Figure 3: CO2/CH4 meter components

LCD Display

The Liquid Crystal Display (LCD) shows the following features:

- CO2, CH4 levels in percentage (##.##%) format
- Logging ON/OFF
- Percentage of free memory

Data Storage

This meter features an internal memory capable of storing 60,000 data points. Due to the nature of the design, this meter will need to be initialized before operation and the logging period and real-time clock will need to be set under the **SETTINGS** menu.

Detector Principal

This meter features a single gas sensor used to detect both, carbon dioxide and methane, simultaneously. This sensor uses proven NDIR (non-dispersive infrared) technology to sense concentrations of these two gases in the air, as a function of transmitted light. The optics in this dual sensor insures good selectivity of these two gases, as well as a long service life.

Operation Guide

Make sure you read through these instructions thoroughly before using the meter. This guide will help you become more familiar with the meter in order to be as productive as possible in a short period of time. Please read the *Important Safeguards* on page 4 before continuing.

IMPORTANT: Follow these instructions to ensure proper set up:

1. Download the GasLab® software to your computer as shown in the *Package Contents*

Please verify that your package contains the following items before using this meter:

UNITS:

- (1) Meter
- (1) 6-foot USB cable
- (1) International power supply
- (1) High-impact carrying case
- (1) Calibration Tag
- (1) User manual
- (1) Fittings, tubing, & filter kit:
    - (1) 10-foot long 1/8" tubing
    - (2) 1/8" Barb tubing bulkhead fitting
    - (2) 1/8" Barb 10-32 UNF fittings
    - (2) Particulate filter (CM-0118)
    - (2) Hydrophobic filter (CM-0117)
    - (1) Moisture trap (CM-0112)

Optional Accessories

If the meter is to operate in environments where humidity is very high (>95% RH), an *Extreme Moisture Filter* (CM-0103) can be purchased separately. This filter will allow free flow of sampled air while keeping moisture out of the meter. A 10,000-hour pump is also available at the time of purchase.

Note: Please contact our technical support staff for more details about these or any other accessories.

1. GasLab® Software section on page 5.
2. Power the meter using the included universal power supply. Turn *ON* ⏻ the meter.
3. Wait until the display changes colors to visually confirm it has reset successfully after connecting it to a computer.

Connecting Meter

The first time the meter is connected to your computer, the operating system will install the necessary USB drivers as shown in ***Figure 4.*** This process could take a few minutes.

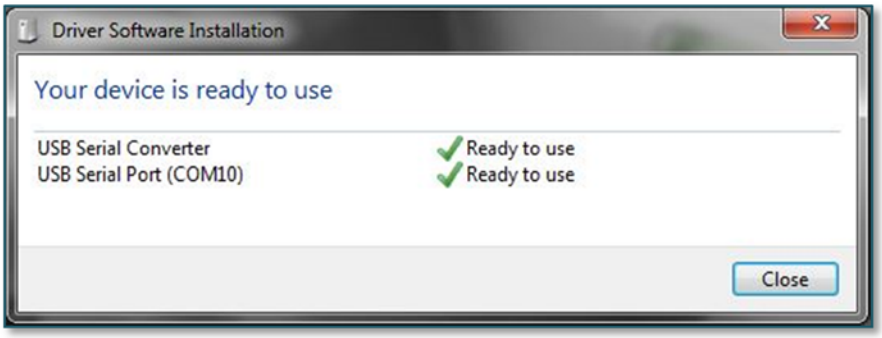

Figure 4: USB Driver Installation.

Logging Data

Once the GasLab® software has been installed and the meter is connected to the computer, you can gather data in a variety of ways. Data can be collected in real time, data logs can be downloaded from the meter's memory and saved to the computer, and data can be reviewed on the meter's LCD display.

For each logging session

1. Turn the meter **ON** by connecting to power supply.
2. The meter must be started at least 1 minute prior to deployment and data logging to allow the sensor enough time to warm-up and calibrate.
3. Set the logging interval as desired using GasLab®.
4. Turn the Log switch to the **ON** position in order to start the logging session.
5. When data logging is completed, turn the Log switch to the **OFF** position in order to stop the logging session and disconnect the meter.

NOTE: Refer to the GasLab® User's Manual for more information.

Setup

The sampling meters will require minimal setup since they are designed to be portable. The most important aspect of the setup involves connecting the sampling hoses and ensuring proper setup. The *Instrument Overview* section on page 8 shows the labeled components of these meters, as referenced throughout the rest of this manual.

Insert four (4) AA size batteries into these units or connect them to the included power supply. All models have an internal coin cell CR-2032 3V battery backup for the real-time clock. This battery is inserted in the factory for your convenience and should last the lifetime of the product.

Sampling Data Logging

Besides including all the features of our sample draw model above, this model also features an internal memory capable of storing data when not connected to a computer. This unit will allow you to simultaneously read and store CO2/CH4 concentration levels data. Due to the nature of their design, this unit should be connected to your computer first, before operation, in order to initialize and set the logging interval and real-time clock.

In order to initialize data logging functionality, the unit MUST be connected to the computer with data logging switched to OFF, and the GasLab® software started. Once the unit has been connected, click on the "Configure Sensor" button in the GasLab® interface, set the data logging interval and pump periods as desired. We recommend leaving the pump interval to the default 5-second period. For the pump period, we recommend 5 or more seconds.

The pump PWM period can also be adjusted for advanced applications, with 1 being full duty cycle, and values approaching 255 being the shortest duty cycle. The pump mode should always be set to "Data logging" for proper operation of the unit.

Settings

Settings – allows you to access all the parameters, options, outputs, communications, and date/time settings to be changed or programmed.

Display Settings

Here you can change the brightness and color theme (3 available) on the device and you can also activate a Screen Timeout to save power. This setting will not affect the meter's functionality but will affect the battery life depending on how you set this parameter.

Port Settings

Here you can configure and activate ports that control additional accessories such as the device Modbus address. Please call technical support for guidance and important information before making changes to the configuration of any of these ports.

Time/Date Settings

Here you can change the date and time on the meter for more accurate reference on the records. The default time of your meter could vary depending on your location. **Review these settings before you start using the meter.**

Logging Settings

Here you can change the logging interval and duration. This will enable you to collect the data for a period of time in a specific logging interval. This screen also gives you the option to set the desired pump interval. Remember to synchronize the pump before, during, or after the logging interval to read and collect the correct reading according to the application.

Data Logs

Will take you where the logs are and you can see the data storage on your device and display it graphically in the same window.

Data Logging Configuration

These meters feature an internal memory capable of storing data when not attached to a personal computer. These units will allow you to simultaneously read and store CO2 and CH4 concentrations level data. Due to the nature of their design, this meter should be connected to your personal computer first, before operation, to initialize and set the logging period, and real-time clock.

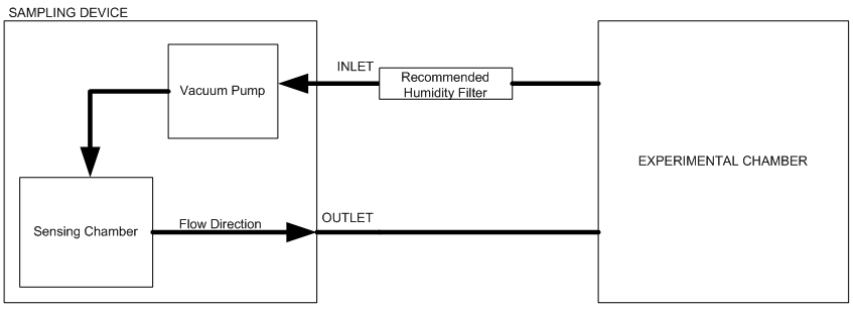

Figure 5: Closed-loop operation

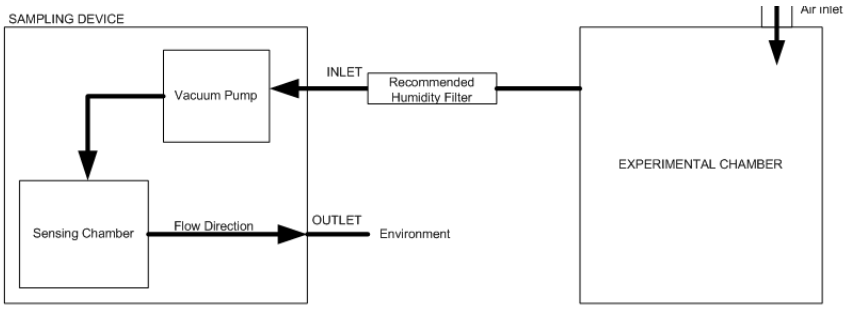

Figure 6: Opened-loop operation

We recommend installing the included humidity/contaminate filter to ensure the sensing chamber and pump baffle stays clear and corrosion free.

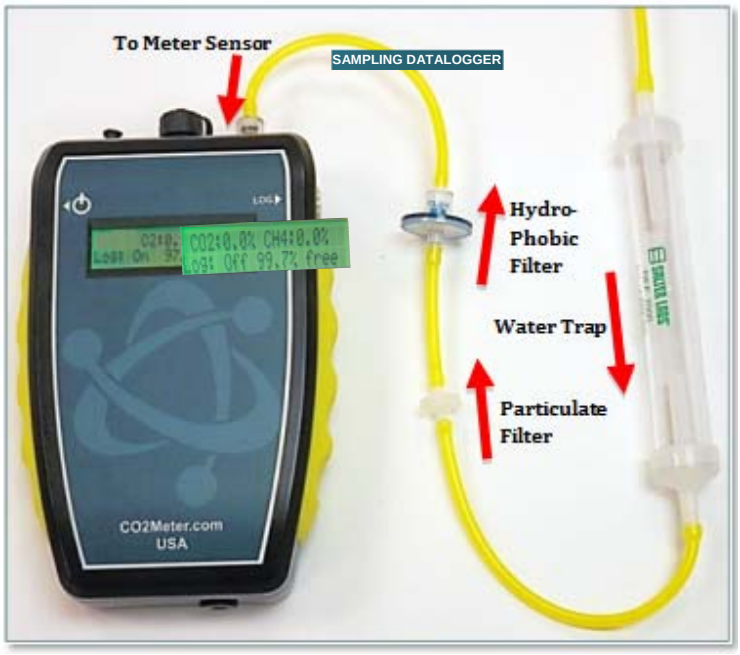

Figure 7: Filter Installation and Orientation

Quick Start Guide

IMPORTANT: MAKE SURE TO INSTALL SOFTWARE BEFORE CONNECTING YOUR METER TO YOUR COMPUTER.

1. Install fresh set of AA batteries (Duracell brand recommended) or connect the included power supply.
2. Install filters and tubing included
3. Turn the meter ON by pressing the power switch once.
4. For data logging models, turn logging ON by pressing the LOG switch once. Once the sampling process is completed, data can be downloaded to your computer using our GasLab® software.

Calibration

These meters are factory-calibrated with multiple gas concentration reference points and have been verified to be accurate within its specific functionality before shipment. However, if they are severely jolted or otherwise mechanically disturbed, the internal sensor can drift, requiring recalibration. All calibration procedures follow a single-point calibration routine that effectively shifts the zero-point of the internal sensors.

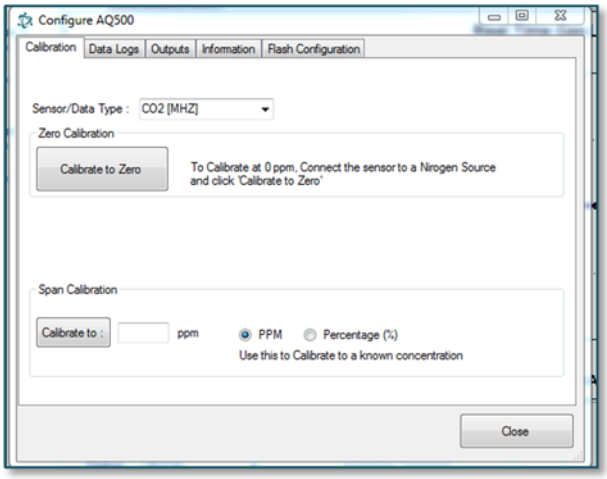

Figure 8: Sampling calibration screen for 50% CO2, 100% CH4

Calibration can be performed using either 0% calibration gas (typically nitrogen, Argon, etc.), or using a fresh source of air, assumed to be approximately 400ppm CO2 and 0% CH4. Attach the calibration gas to the meter and connecting the meter to a computer. Open the calibration screen in the GasLab® software. Click the **CALIBRATE** button in the calibration tab for the desired gas, located in the **CONFIGURE SENSOR** screen. As long as the gas concentration is stable, the unit should instantly reflect the calibrated value. This can be confirmed by watching the LCD display on the unit. To see the calibration value in real time, click in the **COLLECT REAL TIME** button to capture these values before opening the configuration screen.

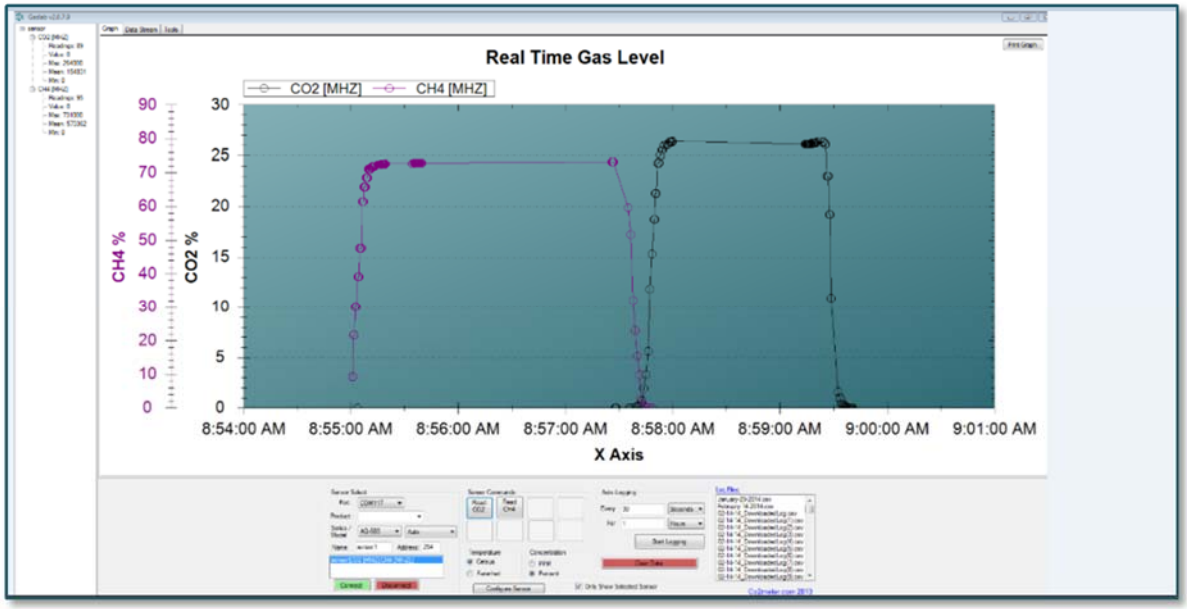

Figure 9: Collecting data in real time

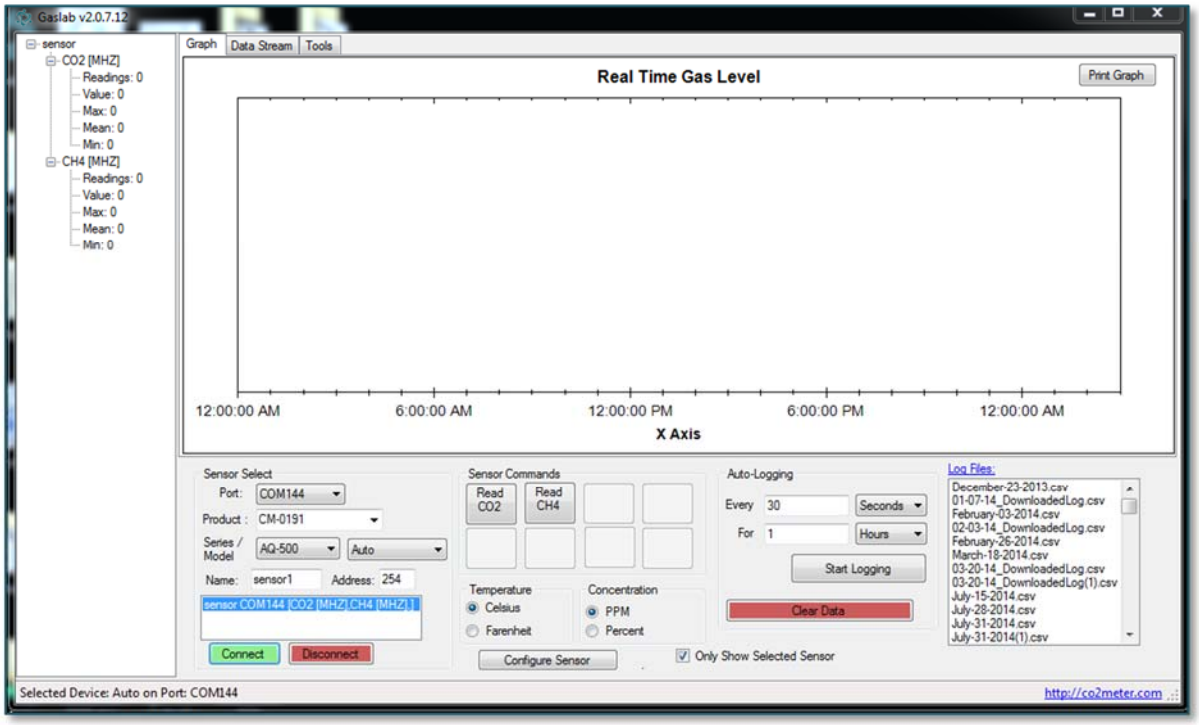

Figure 10: Calibration screen/options

Calibration Procedure

To calibrate your meter, follow these steps:

1. Turn ON the meter.
2. Connect the unit to a calibration gas bottle/cylinder (100% nitrogen or a specific CO2/CH4 calibrate gas) with the appropriate demand regulator.
3. Wait 25 seconds to collect a sample. Write down this value as the "before" value.
4. Click the **CALIBRATE ZERO** or **CALIBRATE SPAN** button after selecting your calibration gas.
5. Wait 25 seconds again. This time, the meter will take a sample and use this data to adjust zero values.
   The displayed measurement will show the new calibration value (0 or depending on method used).
6. Disconnect the calibration gas and wait 25 seconds. All displayed data will now be based on the new calibration value. Repeat this procedure if the sensor is still operating outside of its specified range or if readings vary greatly.

Appendix

Meter Specifications

Sensor Performance and Ratings	**Sensor Type**	Non-dispersive Infrared (NDIR)
	Measuring Range	0-500,000 ppm (50% CO2)
		0-1,000,000 ppm (100% CH4)
	Accuracy	±3% (0-50% full range), ±5% (>50% full range)
	Response Time	<30 sec.
General	**Warm-up Time**	<90 sec.
	Life Expectancy	>15 years
	Maintenance Interval	No maintenance required
Data Logging (CM-0191 only)	**Data Points**	60,000
	Programmable Interval Data	Date, time, CO2/ CH4 %
Pump Characteristics (CM-0191 only)	**Max. Flow (STP)**	0.40 liters/min.
	Max. Vacuum	-150 mbar
	Max. Pressure	500 mbar
	Max. System Pressure	~1 atm (~1 bar)
Power	**Batteries**	Four (4) AA-sized Alkaline
	Input Voltage	6 VDC
	Current Consumption	0.5 W avg. (pump running)
Dimensions	**W x H x D** in(mm)	3.60(91) x 5.75(146) x 1.29(33), excluding boot

Troubleshooting Guide

Symptom / Issue	Possible Cause / Resolution
Unit is not recognized by computer/OS	Make sure unit is connected properly to a suitable 6VDC power source and that the USB cable is properly connected to a computer.
Unit doesn't power ON	Perform resolution above and make sure that there is adequate power to the sensor.
No logs are present on meter	The meter was disconnected while logs were being downloaded. Connect the meter to the computer and download logs again.
The display is blue or showing error	The meter's EEPROM has been corrupted. Improper power supply. Please email our technical support for further assistance.
The GasLab® software doesn't start *[1]	Your software might be out of date. Update your software online at our website or by clicking on the **CHECK FOR UPDATES** under the *Help* menu. Make sure your computer meets the minimum system requirements.
Slow response	Check the air flow channels/tubes to make sure they are not obstructed. Check the parameters of the meter and make sure the speed of the computer is adequate.
Reading doesn't change	Calibration or recalibration needed.

*For more troubleshooting tips on GasLab® software, see its manual located at www.co2meter.com/pages/downloads.

USB Driver Installation Instructions

To install the appropriate USB port drivers compatible with your sensor, follow these steps:

1. Go to http://www.ftdichip.com/Drivers/VCP.htm and download the package appropriate for the version of Windows installed in your computer.
2. Move the file you downloaded to a location you can easily access. Make sure you have administrator privileges.
3. Extract the file by right clicking on it and selecting ***extract here.***
4. Go to your computer's Device Manager in the ***Control Panel***.
   - For Windows 8, press the Windows key and 'x' at the same time to bring up the start menu then click on ***Device Manager***.
   - For Windows 7, open the start menu and type ***Device Manager*** in the search bar.
5. Find the ***Unrecognized USB Device*** in the list (it usually, but not always, has a yellow triangle icon).
6. Right click the ***Unrecognized USB Device*** item and select ***Update Driver Software***.
7. Select ***Browse My Computer*** and point to the folder where you extracted the driver files to (step #3).

This will install the necessary drivers to your computer and allow you to use your sensor with GasLab®. If you have multiple sensors you should only have to perform this procedure once; the operating system will automatically find the driver for all the other sensors.

Support

The quickest way to obtain technical support is via email. Please send all support inquires to **support@co2meter.com**.

Please include a clear, concise definition of the problem and any relevant troubleshooting information or steps taken so far, so we can duplicate the problem and quickly respond to your inquiry.

Warranty

This sensor comes with a 1YEAR (warranty period) limited manufacturer's warranty, starting from the date the sensor was shipped to the buyer.

During this period of time, CO2Meter.com warrants our products to be free from defects in materials and workmanship when used for their intended purpose and agrees to fix or replace (at our discretion) any part or product that fails under normal use. To take advantage of this warranty, the product must be returned to CO2Meter.com at your expense. If, after examination, we determine the product is defective, we will repair or replace it at no additional cost to you.

This warranty does not cover any products that have been subjected to misuse, neglect, accident, modifications or repairs by you or by a third party. No employee or reseller of CO2Meter.com's products may alter this warranty verbally or in writing.

Liability

All liabilities under this agreement shall be limited to the actual cost of the product paid to Edaphic Scientific Pty Ltd. In no event shall Edaphic Scientific be liable for any incidental or consequential damages, lost profits, loss of time, lost sales or loss or damage to data, injury to person or personal property or any other indirect damages as the result of use of our products.

Returns

If the product fails under normal use during the warranty period, a RMA (Return Material Authorization) number must be obtained from Edaphic Scientific Pty Ltd. After the item is received Edaphic Scientific Pty Ltd will repair or replace the item at our discretion.

To obtain a RMA number, email us: info@edaphic.com.au

If we determine that the product failed because of improper use (water damage, dropping, tampering, electrical damage etc.), or if it is beyond the warranty date, we will inform you of the cost to fix or replace the product.

Contact Us

We are here to help!

For information or technical support, please contact us.

info@edaphic.com.au

www.edaphic.com.au

Address:
Edaphic Scientific
PO Box 1843
Port Macquarie, NSW, 2444
Australia